

## Claims

- 1 1. A method of determining an input function for each of a plurality of clocked state  
2 holding elements, said method comprising the steps of:
  - 3 a. determining, for each element, a first Boolean function corresponding to  
4 variables forming an input to that element;
  - 5 b. determining a common gating function for the plurality of elements; and
  - 6 c. determining, for each element, a second Boolean function based on the first  
7 Boolean function and the common gating function, each said second Boolean  
8 function being determined such that it provides the same result as the  
9 respective first Boolean function when the common gating function has a  
10 value of 1, wherein each second Boolean function forms an input function for  
11 the respective element.
- 1 2. The method according to claim 1 further comprising the step of selectively replacing  
2 each said first Boolean function with its respective second Boolean function.
- 1 3. The method according to claim 2 wherein said step of selectively replacing is  
2 dependent upon a comparison of each first and respective second Boolean function  
3 to determine which is the most efficient function.
- 1 4. The method according to claim 4 wherein the most efficient function is the one that  
2 can be implemented with a smaller number of implementation in terms of logical  
3 gates.
- 1 5. The method according to claim 1 wherein the second Boolean function is created by  
2 applying an algorithm to the first Boolean function.
- 1 6. The method of according to claim 5 wherein the algorithm creates a Karnaugh map.
- 1 7. The method according to claim 1, wherein the elements have at least one common  
2 input and the gating function is determined by the steps of

- 3           a. determining, for each element, the conditions under which that element will  
4           hold its current value based only on the common inputs ; and
- 5           b. combining, for each element, the determined conditions to form the gating  
6           function for that element.

1   8. The method according to claim 7 wherein the Boolean function for each element  
2   determines the conditions under which the element will hold its current value.

1   9. The method of claim 1 wherein the recited steps are carried out by computer  
2   software.

1   10. An apparatus for determining an input function for each of a plurality of clocked  
2   state holding elements, comprising:

3           a. means for determining, for each element, a first Boolean function  
4           corresponding to variables forming an input to that element;

5           b. means for determining a common gating function for each of the plurality of  
6           elements; and

7           c. means for determining, for each element, a second Boolean function based on  
8           the first Boolean function and the common gating function, each said second  
9           Boolean function being determined such that it provides the same result as  
10          the respective first Boolean function when the common gating function has a  
11          value of 1, wherein each second Boolean function forms an input function for  
12          the respective element.

1   11. The apparatus according to claim 10 further comprising means for selectively  
2   replacing each first Boolean function with its respective second Boolean function.

1   12. The apparatus according to claim 11 further including means for comparing each  
2   first Boolean function to its respective second Boolean function to determine which  
3   is the more efficient function and providing an output and wherein the means for  
4   selectively replacing is dependent upon this output.

1 13. The apparatus according to claim 12 wherein the most efficient function is the one  
2 that can be implemented with the smallest gating structure.

1 14. The apparatus according to claim 10, wherein the elements have at least one  
2 common input and the gating function is determined by:

3 a. means for determining, for each element, the conditions under which the  
4 element will hold its current value based only on the common inputs ; and

5 b. means for combining, for each element, the conditions to form the gating  
6 function for that element.

1 15. A computer system comprising apparatus for determining a gating function for input  
2 to one of a plurality of clocked state holding elements, said apparatus comprising:

3 a. means for determining, for each element, a first Boolean function  
4 corresponding to variables forming an input to that element;

5 b. means for determining a gating function for each of the plurality of elements;  
6 and

7 c. means for determining, for each element, a second Boolean function which  
8 provides the same result as the first Boolean function when the gating  
9 function has a value of 1.